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AMENDMENTS TO THE CLAIMS

1. (original) A modulator device formed of a semiconductor material which utilises the electro-optic effect to achieve a change in the refractive index of the material (Δn) under the influence of an applied field, F, in accordance with the equation:

$$\Delta n = - \tfrac{1}{2} n_0^3 [rF + sF^2] = \Delta n_L + \Delta n_Q$$

where n_0 is the refractive index of the material at zero field, and Δn_L and Δn_Q are the linear and quadratic contributions to the change in refractive index respectively, r is the linear electro-optic coefficient of the material and s is the quadratic electro-optic coefficient of the material incorporating a plurality of quantum dots and operating in a wavelength region where the value of rF is sufficiently greater than the value of sF^2 so as to operate with the dominant effect on Δn being contributed by the linear effect.

2. (original) A device as claimed in claim 1 in which the band-gap wavelength λ_g of the quantum dots is shorter than the wavelength of the light modulated by the modulator.

3. (original) A device as claimed in claim 2 in which the band-gap wavelength λ_g of the quantum dots is typically 100 nm shorter than the wavelength of the light modulated by the modulator.

4. (currently amended) A device as claimed in claim 1 further comprising ~~An integrated optical device including a path carrying~~ an incoming optical signal of a wavelength λ, means for directing at least part of the signal via a modulation region, and a path for an optical signal;

the modulation region being formed of a semiconducting material incorporating a plurality of quantum dots and exhibiting an electro-optic response thereby to permit variation of the refractive index of at least part of the modulation region;

~~the~~ wherein a band-gap of the semiconducting material incorporating the quantum dots ~~being~~ is such that the corresponding wavelength λ_g is less than λ.

5. (original) An integrated optical device according to claim 4 in which λ_g is less than 1400nm.

6. (original) An integrated optical device according to claim 4 in which λ_g is less than 90% of λ.

7. (original) An integrated optical device according to claim 4 in which the difference between λ_g and λ is greater than 100nm.

8. (currently amended) A device as claimed in claim 1 further comprising ~~An integrated optical device including~~ a path carrying an incoming optical signal of a range of wavelengths between λ_1 and λ_2, means for directing at least part of the signal via a modulation region, and a path for an optical signal;

the modulation region being formed of a semiconducting material incorporating a plurality of quantum dots and exhibiting an electro-optic response thereby to permit variation of the refractive index of at least part of the modulation region;

~~the~~ wherein a band-gap of the semiconducting material incorporating the quantum dots ~~being~~ is such that the corresponding wavelength λ_g is less than both λ_1 and λ_2 by an amount sufficient that the change in refractive index at λ_1 and λ_2 is substantially the same.

9. (original) A device according to claim 8 in which the difference in refractive index at λ_1 and λ_2 is less than 0.1% per nanometer.

10. (previously presented) A device according to claim 8 in which the difference between λ_1 and λ_2 is greater than 1nm.

11. (previously presented) A device as claimed in claim 1 in which the modulator or modulation region is a Mach-Zehnder Interferometer for modulating a beam of laser light, the modulator including a pair of separate waveguides through which the laser light is passed after splitting in a splitting zone and after which the light is recombined in a merge zone, there being provided opposed pairs of electrodes electrically located so as to be able to effect optical

changes within the material of the waveguides, the waveguides being formed of the semiconductor material.

12. (original) A device as claimed in claim 11 in which the Mach-Zehnder Interferometer is a push-pull modulator.

13. (previously presented) A device as claimed in claim 1 in which the semiconductor material is a III-V semiconductor material.

14. (original) A device as claimed in claim 13 in which the III-V semiconductor material is based on a system selected from the group GaAs, InAs based materials and InP based materials.

15. (previously presented) A device as claimed in claim 1 in which the quantum dots are self-assembled quantum dots.

16. (previously presented) A device as claimed in claim 1 in which the quantum dots are formed of InAs based material in host GaAs based semiconductor material.

17. (previously presented) A device as claimed in claim 1 in which the quantum dots are formed of InGaAs based material in host GaAs based semiconductor material.

18. (previously presented) A device as claimed in claim 1 in which the quantum dots are formed of InAs based material in host $In_xGa_{1-x}As_yP_{1-y}$based semiconductor material.

19. (previously presented) A device as claimed in claim 1 in which the quantum dots are formed of InGaAs based material in host $In_xGa_{1-x}As_yP_{1-y}$ based semiconductor material.

20. (previously presented) A device as claimed in claim 1 in which the quantum dots are formed by a chemical etching process.